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[5151]-105

**F.E. EXAMINATION, 2017**  
**ENGINEERING CHEMISTRY**  
**(2015 PATTERN)**

**Time : Three Hours**

**Maximum Marks : 50**

- N.B. :-** (i) Neat diagrams must be drawn wherever necessary.  
(ii) Figures to the right indicate full marks.  
(iii) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.  
(iv) Assume suitable data, if necessary.

1. (a) What are zeolites ? Explain zeolite process for softening of water. Give regeneration reactions, advantages and disadvantages of the process. [6]  
(b) What is reference electrode ? Draw neat labelled diagram of calomel electrode and give its representation. [3]  
(c) Explain conductometric titration curve for the reaction between KCl and AgNO<sub>3</sub>. [3]

*Or*

2. (a) Explain the pH metric titration of mixture of weak acid-strong acid against standard alkali, giving chemical reactions, procedure, titration curve and calculations. [6]

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- (b) 50 ml of water sample requires 15 ml of 0.02 M EDTA during titration. Whereas 50 ml of boiled water sample requires 11 ml of same EDTA in the titration. Calculate total, temporary and permanent hardness of water sample. [3]
- (c) What are the merits of green synthesis and demerits of traditional synthesis of polycarbonate. [3]
3. (a) What is vulcanisation of rubber ? Explain chemical reaction involved in vulcanisation process. Compare natural rubber with vulcanised rubber. [6]
- (b) Define : [3]
- (i) Octane number
- (ii) Power alcohol
- (iii) Gross calorific value.
- (c) A fuel has the following composition by mass :  
 $e = 83\%$ ,  $H_2 = 12\%$ ,  $S = 1\%$ ,  $O_2 = 3.2\%$  and remaining being ash. Calculate quantity of air. [3]

Or

4. (a) What is proximate analysis of coal ? Explain the procedure for determination of each constituent with its formula. [6]
- (b) Distinguish between LDPE and HDPE. [3]
- (c) What is biodegradable polymer ? Give the structure of PHBV and its applications. [3]

5. (a) State the difficulties in storage of hydrogen gas. Give its chemical storage in analates and metal hydrides. [5]
- (b) Give the preparation reaction and applications of germane and lithium hydride. [4]
- (c) Explain the structure and properties of graphite. [4]

*Or*

6. (a) Explain the structure of fullerene. Give any *two* properties and *two* applications of fullerene. [5]
- (b) Explain the production of hydrogen by water splitting using solar energy. [4]
- (c) Explain the isotopes of carbon with their applications. [4]
7. (a) Explain the mechanism of dry corrosion. Discuss the oxidation corrosion in case of Mg, Cr, Mo. [5]
- (b) What is the principle of cathodic protection. Explain it with any *one* suitable method. [4]
- (c) Explain cementation and cladding methods for applying metallic coatings on base metal. [4]

*Or*

8. (a) Define wet corrosion. Explain corrosion by oxygen absorption mechanism. [5]
- (b) What are the factors affecting corrosion ? (Explain nature of metal only) [4]
- (c) Discuss various steps involved in powder coating. [4]